

SCHWEGMAN ■ LUNDBERG ■ WOESSNER ■ KLUTH
P A T E N T . T R A D E M A R K & C O P Y R I G H T A T T O R N E Y S
P.O. Box 2938
Minneapolis, MN 55402
Telephone (612) 373-6900 Facsimile (612) 339-3061

April 7, 2006

Time: 11:45 a.m. CDT
(Minneapolis, Minn.)

TO: Commissioner for Patents
Attn: Essama Omgbा
Patent Examining Corps
Facsimile Center
P.O. Box 1450
Alexandria, VA 22313-1450

FROM: Ann M. McCrackin
OUR REF: 884.467US2
TELEPHONE: 571-272-4532

FAX NUMBER (571) 273-4532

* Please deliver to Examiner Essama Omgbा in Art Unit 3726. *

Document(s) Transmitted: Declaration under 37 C.F.R. §1.131 -- per your request

Total pages of this transmission, including cover letter: 19 pgs.
If you do NOT receive all of the pages described above, please telephone us at 612-373-6900 or fax us at 612-339-3061.

In re. Patent Application of: Daniel P. Carter et al.

Examiner: Essama Omgbा

Serial No.: 10/656,968

Group Art Unit: 3726

Filed: September 5, 2003

Docket No.: 884.467US2

Title: Electronic Assemblies With High Capacity Heat Sinks and Methods of Manufacture

S/N 09/950,100PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Daniel P. Carter et al. Examiner: Gregory Thompson
Serial No.: 09/950,100 Group Art Unit: 2835
Filed: September 10, 2001 Docket: 884.467US1
Title: ELECTRONIC ASSEMBLIES WITH HIGH CAPACITY CURVED FIN HEAT SINKS

DECLARATION UNDER 37 C.F.R. § 1.131

Commissioner for Patents
Washington, D.C. 20231

This declaration is submitted under 37 C.F.R. §1.131 prior to any final rejection of U. S. Patent Application Serial Number 09/950,100 to establish invention of the subject matter of the rejected claims prior to March 5, 2001.

I, Mike S. Brazel, do hereby declare:

1. I have been employed by Intel Corporation as a laboratory technician from a time prior to March 5, 2001.
2. Prior to March 5, 2001, at the direction of Gene Kraft, another employee of Intel Corporation, I performed a series of tests on a prototype curved fin heat sink (hereafter "the Prototype") in the United States. A photograph of the Prototype taken prior to March 5, 2001 is attached as Exhibit A (1 page).
3. These tests measured the value of θ_{CA} ("theta CA") representing the thermal resistance of the Prototype when transferring heat from an integrated circuit ("IC") case to ambient air. For these tests, the Prototype was mounted in an electronic assembly that included (a) a test board, (b) a Thermal Test Vehicle ("TTV") mounted on the test board and simulating a heat-generating IC, (c) an Integrated Heat Spreader ("IHS") mounted on the TTV, (d) the Prototype with an internal core mounted in thermal contact with the IHS, (e) a fan shroud, and (f) an axial flow fan. A photograph of the electronic assembly used to test the Prototype, taken prior to March 5, 2001, is attached as Exhibit B (1 page).

DECLARATION UNDER 57 C.F.R. § 1.131

Serial Number: 09/930,100

Filing Date: September 10, 2001

Title: ELECTRONIC ASSEMBLIES WITH HIGH CAPACITY CURVED FIN HEAT SINKS

Page 2

Dkt: 884467US1

4. A copy of pages 1, 3-4, and 6 of my Test Log, in my handwriting, is attached hereto as Exhibit C (4 pages). The dates deleted from Exhibit C are prior to March 5, 2001. All photographs attached hereto were taken prior to March 5, 2001.

- a. Page 1 describes some of my preparations of the Prototype for thermal and acoustic testing, including installation of a thermocouple ("TC") in a small hole made in the heat sink central core for the purpose of measuring the heat sink temperature ("Ts"). A photograph of the TC installation in the Prototype core is attached hereto as Exhibit D (1 page).
- b. Page 1 also describes mounting the core of the Prototype on the IHS of the TTV. Page 1 further describes mounting a Nidec M34605 axial flow fan with adapter, a 20mm fan shroud, and a 3mm fan shroud shim on the Prototype.
- c. A photograph of a Nidec M34605 axial flow fan with adapter is attached hereto as Exhibit E (1 page).
- d. A photograph of 15mm, 20mm, and 25mm fan shrouds is attached hereto as Exhibit F (1 page).
- e. A photograph of 2mm and 3mm fan shroud shims is attached hereto as Exhibit G (1 page).
- f. Page 3 describes additional preparations, including gluing a TC to the TTV case. The TTV was a silicon device, approximating the dimensions of an actual IC product under development, that contained heater coils to generate heat. A groove was machined from the edge of the TTV's IHS to the center, and a TC was glued in the groove for the purpose of measuring the TTV case temperature ("Tc").

DECLARATION UNDER 37 C.F.R. § 1.131

Serial Number: 09/950,100

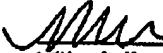
Filing Date: September 10, 2001

Title: ELECTRONIC ASSEMBLIES WITH HIGH CAPACITY CURVED FIN HEAT SINKS

Page 3
Dkt: 884467US1

- g. Page 4 describes my taking photographs of the test set-up. A photograph of the base of the Prototype in thermal contact with the IHS is attached hereto as Exhibit H (1 page).
- h. During a series of 20 tests performed in the United States prior to March 5, 2001, I measured and recorded the temperature of the IC case ("T_C"), of the ambient air ("T_A"), and of the heat sink ("T_S"), for various sizes of fans, fan shrouds, and fan shroud shims, and I calculated a value of θ_{CA} (indicated in units of degree Centigrade per watt) for each test, using the equation:
- $$\theta_{CA} = (T_C - T_A) / \text{Power}$$
- i. Page 6 describes, as an example, test results for Test 1 for the indicated set-up and operating conditions. The power applied to the TTV was 65 watts. T_C was measured at 43.5 degrees Centigrade; T_A was 24.0; and T_S was 35.9. θ_{CA} was calculated at .300.
- j. Prior to March 5, 2001, I made the results of this series of tests available to other members of my engineering group at Intel Corporation, including Ben M. Broili, at which time both Mr. Broili and I believed that the Prototype worked satisfactorily for its intended purpose, i.e. to transfer heat from an IC case to ambient air.

5. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Date: 2-18-03
Mike S. Brazel

DECLARATION UNDER 37 C.F.R. § 1.131

Serial Number: 09/930,100

Filing Date: September 10, 2001

Title: ELECTRONIC ASSEMBLIES WITH HIGH CAPACITY CURVED FIN HEAT SINKS

Page 4
Dkt: 884467US1

Respectfully submitted,

DANIEL P. CARTER et al.

By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
309 W. Conrad Dr.
Phoenix, Arizona 85023
(602) 268-8920

Date: 2/18/2003

By:

Walter W. Nielsen

Walter W. Nielsen

Reg. No. 25,539

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 18th day of February, 2003.

Name

Anne M. Richards

Signature

Anne M. Richards

EXHIBIT A

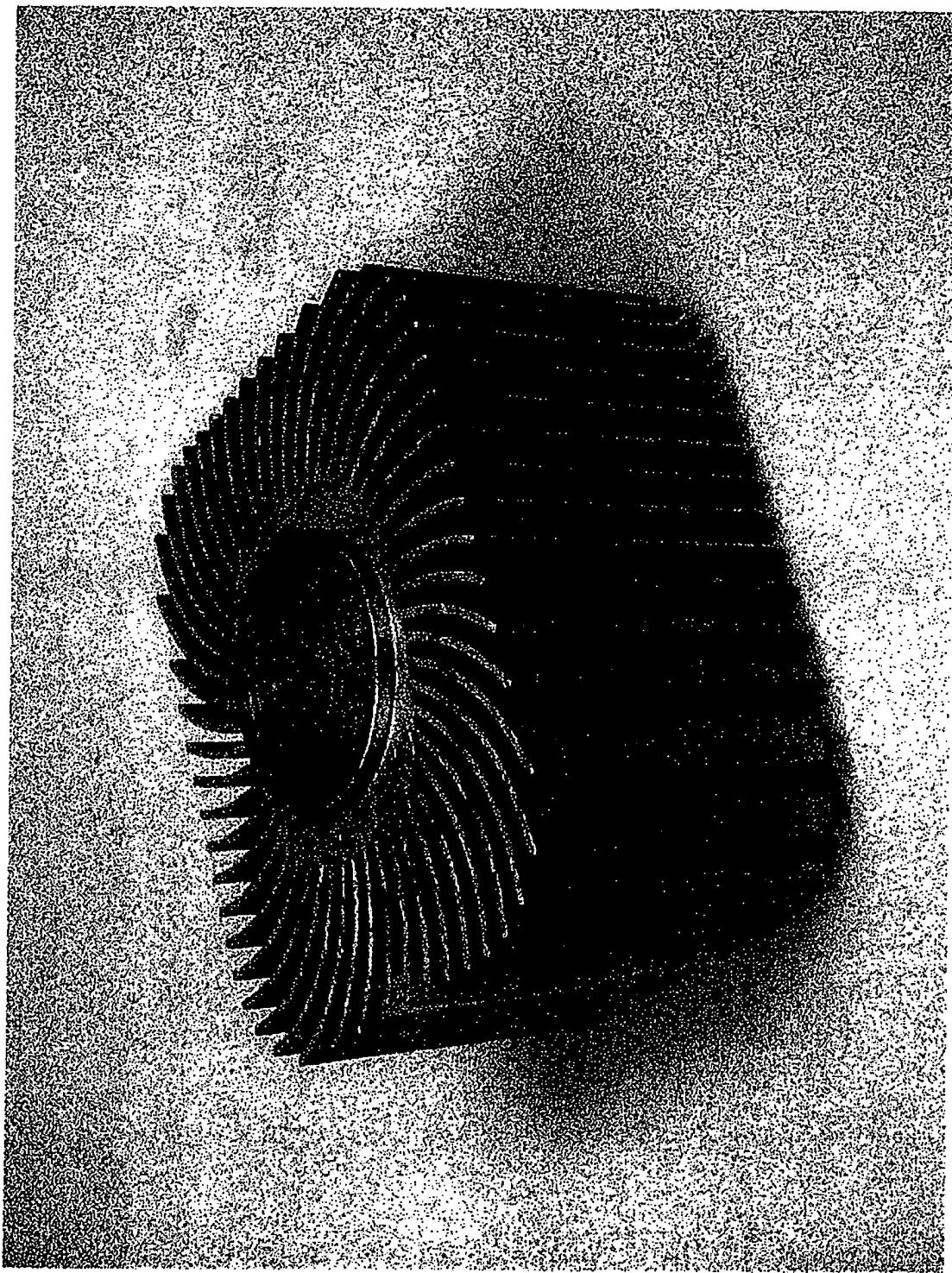


EXHIBIT B

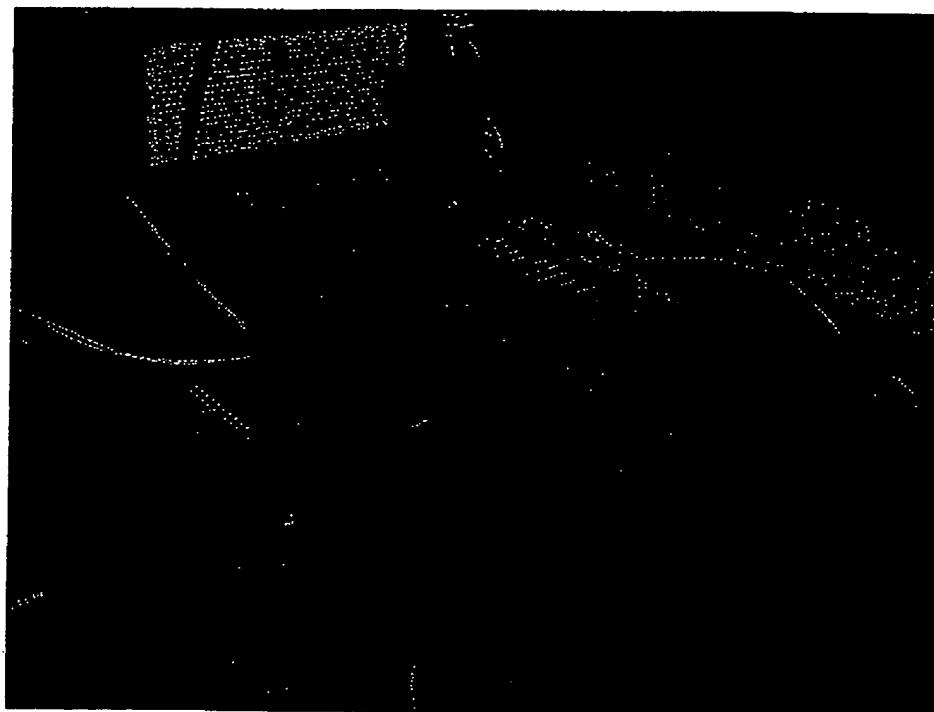


EXHIBIT C
intel. THERMAL - MECHANICAL DEVELOPMENT LAB

TEST LOG	
DATE:	TECHNICIAN: M. Brazil
<ul style="list-style-type: none"> Reviewed TR with Gene <ul style="list-style-type: none"> Waiting on last fan (add) Will begin prep and testing 	
<ul style="list-style-type: none"> Prep heatsink <ul style="list-style-type: none"> drilled small indent in side of base (Copper Core) installed TC 5TC-TT-T-30-72 (Pcs. 4.0k) TC .03" from base 	
<ul style="list-style-type: none"> Verify Board and TTV operate <ul style="list-style-type: none"> TTV TTVW1 # D9356.06.7-01.S5 Board EPTV 3 # 1 .65 Amp @ 10 Volts 	
<ul style="list-style-type: none"> Assemble Test 1 <ul style="list-style-type: none"> Test 1 Config. <ul style="list-style-type: none"> Shroud 26mm fan Nidec-M3460S w/adapter 3mm fan shroud shift Taped fan to adapter to seal gaps Assemble Sample 1 <ul style="list-style-type: none"> Heatsink and Shroud are Symmetric, RM and Board layout are not. Heatsink core is offset from center of IHS by ~0.11" Blockage set 5.5" from Bench. 3 blocks 4"+1"+.5" <ul style="list-style-type: none"> 1.14" clearance to fan top + Start test 2:00pm RPM 6957, C 12 Volts Complete test 3:00pm Start Test 2 3:00pm Abort 2:15pm. Test aborted, change TTV to TTV w/T case TC 	
TR# 94 Test Title: Willamette/Northwood Extension DOE	

Page 1

INTEL CONFIDENTIAL

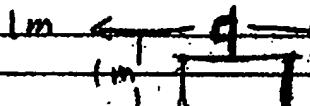
EXHIBIT C, cont.**intel. THERMAL - MECHANICAL DEVELOPMENT LAB**

TEST LOG	
DATE:	TECHNICIAN: M. Bratzel
<p><i>Set up -</i></p> <ul style="list-style-type: none"> • Glued TC to TTV Case • TTV # 20912610 Rev. 3.9 Arms 	
<p><i>Assembled test Sample 1 for test 1,2</i></p>	
<p><i>Config</i></p> <ul style="list-style-type: none"> • TTV 20912610 • Lx751 Grease • TC 5TC-TT-0-30-72 • fan Shroud 20 mm • fan Shroud Shim 3mm • Willamette clips Rev 01B • Board EPTV3 #1 • Nidec-m34605 fan w/ adapter 	
<ul style="list-style-type: none"> • Test Assembly Ready for test 1 • Start test @ 8:30 am • Core 65W • fan 12 W - RPM~6900 	
<p><i>Test Complete 11:00 am -</i></p> <ul style="list-style-type: none"> • wait 	
<p><i>TRB 94</i></p>	
<p><i>Test Title: NW - Willamette Extension DAS</i></p>	

INTEL CONFIDENTIAL

Page 3

EXHIBIT C, cont.**intel. THERMAL - MECHANICAL DEVELOPMENT LAB**

TEST LOG	
DATE	TECHNICIAN: M. Brazil
<ul style="list-style-type: none"> • Accoustic 1,2 	
<ul style="list-style-type: none"> • Test Set up. 	
<ul style="list-style-type: none"> • Secure Sample to Test Ring 	
<ul style="list-style-type: none"> • Arrange accoustic Sampling 	
	
<ul style="list-style-type: none"> • RPM indicator 	
<ul style="list-style-type: none"> • Photo's of test set up. 	
<ul style="list-style-type: none"> • Rm Backround Noise check 	
<ul style="list-style-type: none"> • Rm Test 1 	
<ul style="list-style-type: none"> • Disassemble / Reassemble 	
<ul style="list-style-type: none"> • Rm Test 2 	
<p>Test 3-8 TS(9.1) TC(3.8)</p>	
<p>Test set up</p>	
<p>#3 config -</p>	
<ul style="list-style-type: none"> • 25mm Shroud 	
<ul style="list-style-type: none"> • Nides - M34105 fan 1/4" adaptor 6890 cpm 	
<ul style="list-style-type: none"> • 0mm Shim 	
<ul style="list-style-type: none"> • Start test 11:30am 	
<ul style="list-style-type: none"> • End test 12:00 am 	
<p>Test set up</p>	
<p>#4 config</p>	
<ul style="list-style-type: none"> • 25mm Shroud 	
<ul style="list-style-type: none"> • Nides - m34105 fan 1/4" adaptor 6850 cpm 	
<ul style="list-style-type: none"> • 0mm Shim 	
<p>Start 12:00 / End 12:40</p>	
<p>TRB q4</p>	
<p>Test Time: NW/Willamette Extension Date</p>	
<p style="text-align: right;">4 Page</p>	

INTEL CONFIDENTIAL

EXHIBIT C, cont.**intel. THERMAL - MECHANICAL DEVELOPMENT LAB**

TEST LOG	
DATE:	TECHNICIAN: M. Grawe
<i>Re Test # 2</i>	
<ul style="list-style-type: none"> • Due to unexplained data from DAQ, will Switch to Data logger. 	
<i>Test # 1, 2</i>	
<ul style="list-style-type: none"> • 20mm fan shroud • 3mm Shim • Nidec - M34605 w/adapter • Case TC 3.7 Ω • Sink TC 4.2 Ω 	
<i>25 minutes soak</i>	
<i>Test 2</i> $T_C = 43.5^\circ$ $T_A = 24^\circ$ $T_S = 35.7^\circ$	
$\Theta_{ta} CG = .300$ $\Theta_{ta} SG = .180$ Power 608 mW RPM 6900	
<i>Test 2</i>	
$T_C = 43.4^\circ$ $T_A > 24.0^\circ$ $T_S > 35.9^\circ$	
<i>20 minute soak</i>	
$\Theta_{ta} CG = .298$ $\Theta_{ta} SG = .183$ Power 605 mW RPM 6920	
<i>Test 3 set up</i>	
<ul style="list-style-type: none"> • 25mm Shroud • Nidec - M34605 • 5mm Shim 	
<i>Test 3</i> $T_C = 42.4^\circ$ $T_A = 23.4^\circ$ $T_S = 35.5^\circ$	
<i>20 minute soak</i>	
$\Theta_{ta} CG = .292$ $\Theta_{ta} SG = .186$ Power 656 mW RPM 6880	
<i>TR# 94</i>	
<i>Test Title: NW/Willamette OEM</i>	
6 Page	

INTEL CONFIDENTIAL

EXHIBIT D

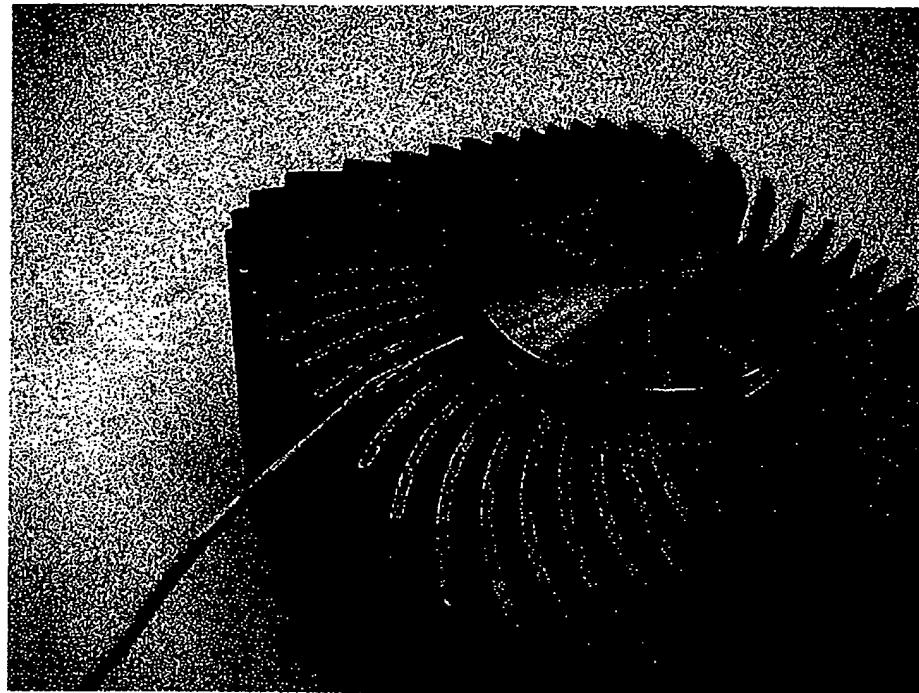


EXHIBIT E

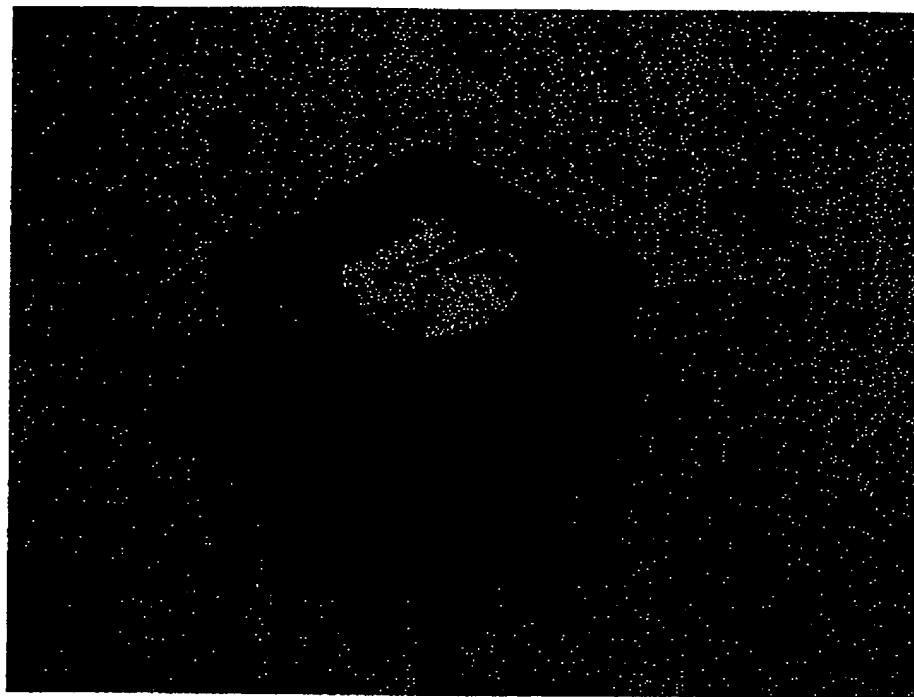


EXHIBIT F

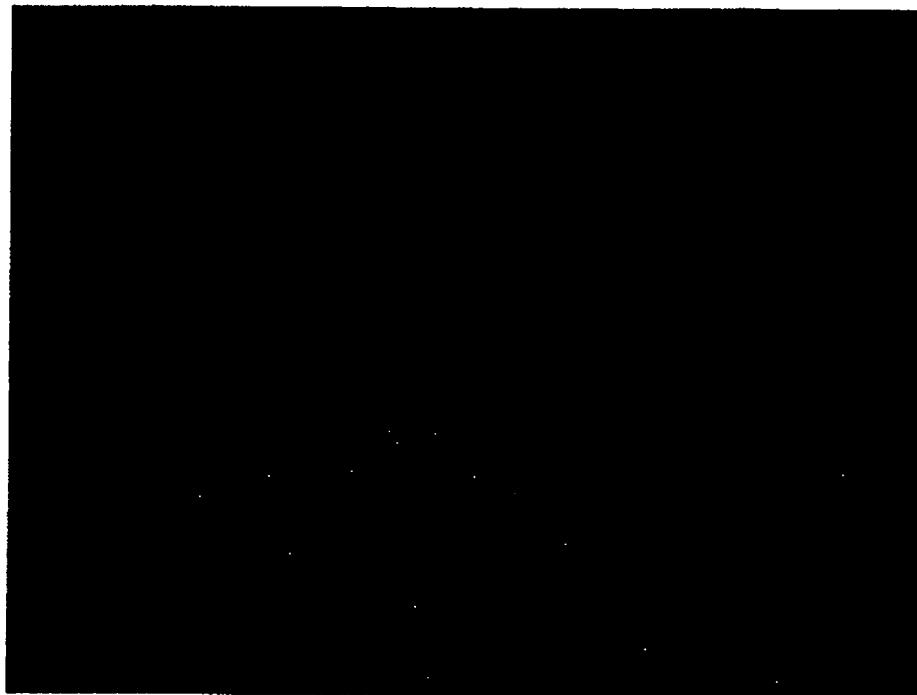


EXHIBIT G

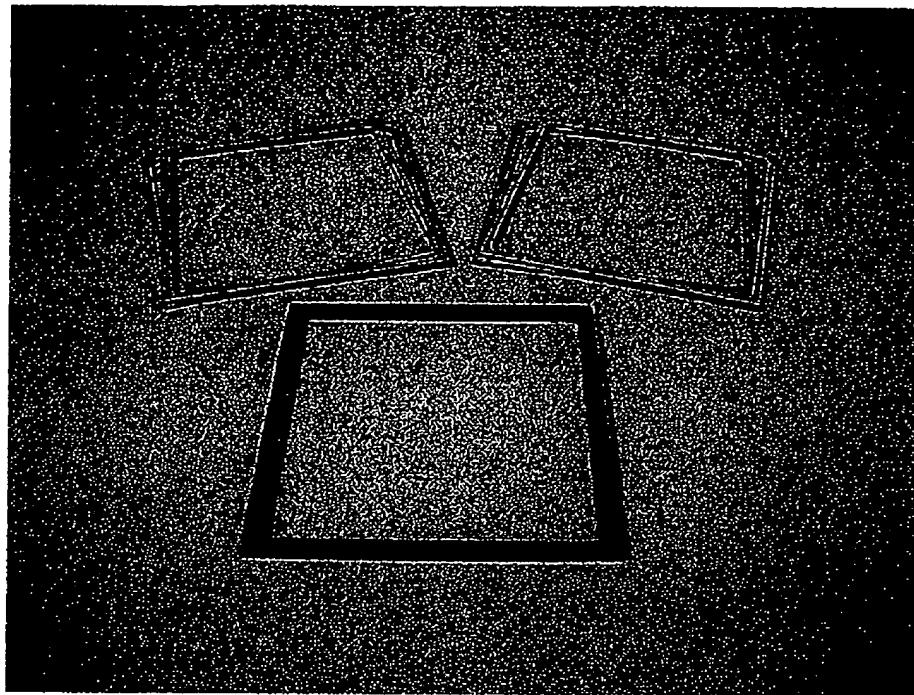
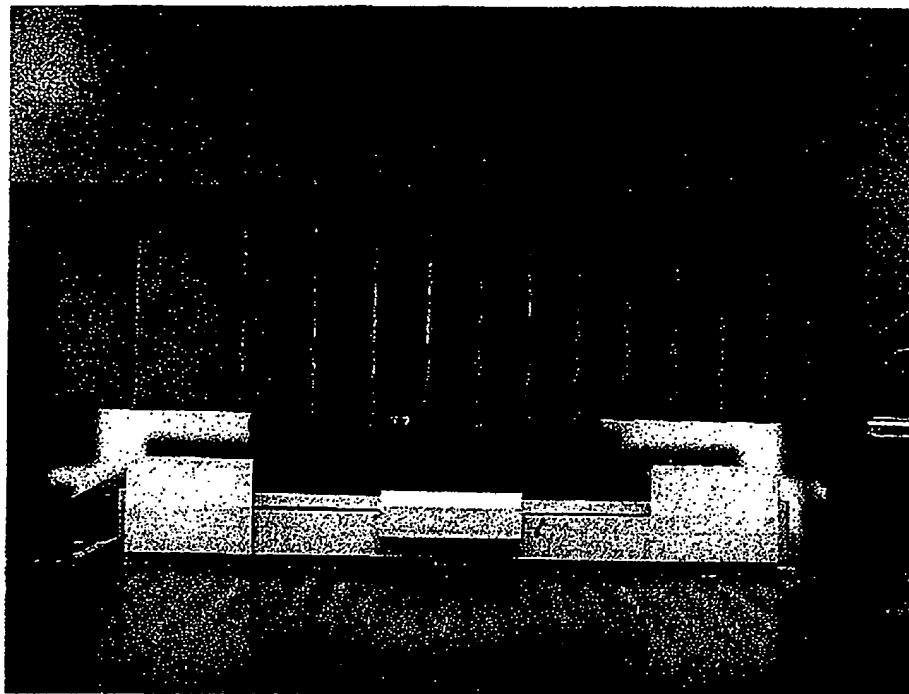


EXHIBIT H



S/N 09/950,100PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Daniel P. Carter et al. Examiner: Gregory Thompson
Serial No.: 09/950,100 Group Art Unit: 2835
Filed: September 10, 2001 Docket: 884.467US1
Title: ELECTRONIC ASSEMBLIES WITH HIGH CAPACITY CURVED FIN HEAT SINKS

DECLARATION UNDER 37 C.F.R. § 1.131

Commissioner for Patents
Washington, D.C. 20231

This declaration is submitted under 37 C.F.R. §1.131 prior to any final rejection of U. S. Patent Application Serial Number 09/950,100 to establish invention of the subject matter of the rejected claims prior to March 5, 2001.

I, Ben M. Broili, do hereby declare:

1. I am a co-inventor of the inventive subject matter shown in FIGS. 5-10 of the present application and described therein. A copy of FIGS. 5-10 is attached hereto as Exhibit A (5 pages).
2. Prior to March 5, 2001, the inventive subject matter that is shown in FIGS. 5-10 and claimed in corresponding claims of the present application was completed in the United States as evidenced by the following:
 - a. Prior to March 5, 2001, having earlier conceived the subject matter in the United States with my co-inventors, I personally picked up a prototype curved fin heat sink (hereafter "the Prototype") from ProCam Machine Inc., located at 17905 Bothell Everett Hwy., D101, Bothell, Washington. ProCam Machine Inc. had been directed by my employer, Intel Corporation, to fabricate the Prototype from engineering drawings that I prepared. An invoice for the Prototype is attached as Exhibit B (1 page). The dates deleted from Exhibit B are prior to March 5, 2001. The Prototype is identified on Exhibit B as "HEATSINK WMT HS".

TOTAL P.02

DECLARATION UNDER 37 C.F.R. § 1.131

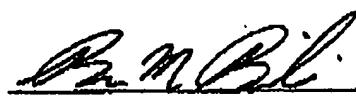
Serial Number: 09/950,100

Filing Date: September 10, 2001

Title: ELECTRONIC ASSEMBLIES WITH HIGH CAPACITY CURVED FIN HEAT SINKS

Page 2
Dkt: 884467US1

- b. Prior to March 5, 2001, Mike S. Brazel, a lab technician at my employer, Intel Corporation, performed a series of tests on the Prototype in the United States. These tests measured the value of θ_{CA} ("theta CA") representing the thermal resistance of the Prototype when transferring heat from an integrated circuit ("IC") case to ambient air. For these tests, the Prototype was mounted in an electronic assembly that included (1) a test board, (2) a Thermal Test Vehicle ("TTV") mounted on the test board and simulating a heat-generating IC, (3) an Integrated Heat Spreader ("IHS") mounted on the TTV, (4) the Prototype with an internal core mounted in thermal contact with the IHS, (5) a fan shroud, and (6) an axial flow fan. A photograph of the Prototype taken prior to March 5, 2001 is attached as Exhibit C (1 page).
- c. Prior to March 5, 2001, Mr. Brazel made the results of this series of tests available to me, at which time both Mr. Brazel and I believed that the Prototype worked satisfactorily for its intended purpose, i.e. to transfer heat from an IC case to ambient air.
3. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Date: 2/14/03

Ben M. Broili

DECLARATION UNDER 37 C.F.R. § 1.131

Serial Number: 09/950,100

Filing Date: September 10, 2001

Title: ELECTRONIC ASSEMBLIES WITH HIGH CAPACITY CURVED FIN HEAT SINKS

Page 3
Dkt: 884.467US1

Respectfully submitted,

DANIEL P. CARTER et al.

By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
309 W. Conrad Dr.
Phoenix/Arizona 85023
(602) 298-8920

Date: 2/17/03By: Walter W. Nielsen
Walter W. Nielsen
Reg. No. 25,539

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 17th day of February, 2003.

Anne M. Richards Anne M. Rich
Name Signature